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CHEMISTS AND TECHNOLOGISTS

THE increasing degree of expert knowledge required in manufacturing processes is causing attention to be paid to the training of those who enter industry. There was a time when nearly everyone started an industrial career by going into the works or offices or laboratories direct from school and largely picked up his technical training as he went along. By far the greater number of new entrants to industry still follow that path, and it may always be the pathway of the majority. The difficulty of securing sufficient training establishments and sufficient teachers, no less than the need to earn money at an early age, will continue to cause direct entry into industry from school to be the most popular method of approach to an industrial career for some time to come. Industry must, therefore, reconcile itself to the fact that it will have to train most of its own employees and staff.

There is, however, an increasing call for specialization in industry and this specialization must start at a comparatively early age. Many of those who have started without specialization, perhaps in the laboratory straight from school, perhaps on the works as a premium pupil or as an ordinary employee, have made good and are to be found to-day occupying high positions in the gas and in other industries. That is a tribute to the diligence with which they have continued to pursue their studies and to their perseverance in the face of many difficulties. It does not, however, mean that the old system is necessarily the best. There is much to be said for the view that in the future those who aspire to the highest positions will generally be those who have specialized successfully in one of the professions before entering industry. This does not mean, of course, that the others who begin in a more humble way will be debarred from high positions for there are many who have sufficient natural abilities to rise high in the world of affairs without having specialized knowledge in any particular science. Increasing knowledge and understanding of the principles of science and engineering will be needed, however, and we may as well face the fact that the views on training which were held 20 years ago are now out of date.

The Beginning of a Fuel Technologist

We are concerned here principally with the fuel industries and it is well to remember that these industries have many sides. The mining engineer, the gas engineer, the electrical engineer, the oil engineer, and the chemical engineer are all different grades of fuel engineers. It is not, however, necessary to start as an engineer in order to be a good fuel technologist and there is a strong body of opinion to maintain that a fuel technologist is more essentially a chemist than an engineer, and that a thorough training in chemistry will be the best possible start to the career of a fuel technologist. It is well to recognize also that the "fuel technologist" is not generally and solely a specialist in fuel. In most industries, the control of fuel utilization is only a part of the work of the engineer or chemist. There are comparatively few factories that burn sufficient amounts of coal, gas, oil, &c., to employ a specialized fuel technologist with no other job to do. More generally there is—or should be—a good mechanical engineer or a good chemist who will in addition to his particular knowledge of the processes of the industry in which he is engaged also have a sufficient knowledge of fuel to enable him to be classed as a fuel technologist. It is for lack of a sufficient number of these people in industry that we are in the present difficult fuel position. Undoubtedly, if the profession of fuel technology had been 50 years old instead of 25 years old, industry would have developed on different lines and we should probably be using not more than three-quarters as much coal as we are using to-day, so that there would be no fuel problem. The first essential, therefore, in the long term solution of our fuel problem is to see that more people with a "topping-up" of knowledge of fuel utilization are employed in industry. This would be to the advantage of the fuel industries themselves, and especially of the Gas Industry, because with the more refined fuels efficiency in use and a knowledge of the correct conditions for use becomes of increasing importance. Fuel can only be used wastefully if it is cheap fuel. Only when fuel is used skilfully can an expensive fuel be employed.

Specialization

In the fuel-producing industries, however, the problem is rather different because, here the specialist in fuel comes into his own since he is engaged in manufacturing or handling one of the major fuels—solid, liquid, or gaseous—which are supplied to industrial and domestic consumers. Even so, however, the scope for the pure fuel technologist is still somewhat limited, if we define fuel technology as the art of producing or utilizing fuel. Many other specialists are needed, though all must acquire a background of fuel technology. We return, therefore, to the conception of specialization as the most useful beginning to an industrial career. A man must be a good chemist or a good engineer first; afterwards he can widen his scope and develop in other directions. Sir Ernest Smith evidently had something of this sort in mind when preparing his Address to the Fuel, Power, and Transport Section of the 11th International Congress of Pure and Applied Chemistry. Discussing the training of

chemists for the fuel industries, Sir Ernest began by assuming that the industrial chemist would be fully qualified academically—*i.e.*, that he would have taken the equivalent of an Honours Degree in Chemistry or an Associateship of the Royal Institute of Chemistry. In this way he would acquire a thorough knowledge of the fundamentals of the science and have developed a scientific attitude of mind. Nevertheless, there will always be a place for the chemist whose training is considerably less ambitious than this—the fellow who Sir Ernest has described as the "half-trained chemist." He is the man who in the past quite frequently has gone on to be an industrial works manager or the engineer and manager of, say, a gas undertaking through his own qualities and his ability to pick up his knowledge as he has gone along. We are inclined to think that the scope for such "half-trained" chemists and engineers in the future may be less than it has been in the past because a deeper knowledge either of science or of engineering will probably be needed for the higher positions in the Gas Industry if and when the Industry is controlled nationally. These are the tools, and every workman must be supplied with the tools of his trade. It is very important that we should increase the number of juniors who have this fundamental knowledge because, as Sir Ernest emphasized, it is the work of the rank and file of industrial scientifically trained chemists which will have the major effect on the development of industry. It is from their ranks that the bulk of ideas for improvement should come. They it is who determine the essential facts which are to form the foundation upon which the industry shall build. It is they who should be able to plan the development of a works or of an industry on the basis of ascertained facts.

Sir Ernest believes that the industrial chemist of the fuel industry should be the main source of supply of production managers. We should not disagree with this because production in an industry based on chemistry must be essentially a chemist's job. There are many, nevertheless, who would disagree with it on the ground that it is primarily an engineer's job. We have heard over and over again the view expressed that the chemist is too much wrapped up in his laboratory and is too accustomed to the test-tube scale to be able to come out into the human world to manage human relationships and to operate plants which work in as many tons as the chemist has been used to operate in milligrammes. Where lies the truth?

The Question of Environment

The truth of the matter appears to us to be that everything depends upon the environment in which the chemist grows up. He may be kept narrowly in the laboratory, being sent into the works only to take measurements or to collect samples. If the chemist is made to stay within his own little orbit he will be nothing more than a laboratory chemist. Lest there are those who feel that the words "nothing more" convey a slighting reference to the work of the laboratory chemist, let us hasten to say that there are gifted chemists who can stay in the laboratory all their lives and can produce their results, generally research results, which are of enormous value to industry. They are the élite of the profession. If a chemist is not so gifted, however, and is compelled to stay within the narrow orbit of his laboratory and of his fellow chemists, he will tend as the years go by to be increasingly less potentially valuable to his employers. It should be possible at a comparatively early age and after a very few years in the laboratory to determine whether a chemist is sufficiently gifted in his profession to remain a chemist or whether he should be put into the more practical world of the works to be trained as a works operator where common-sense with much less scientific knowledge will suffice. The onus of that decision must rest upon his employer, on the chief engineer or the chief chemist of his undertaking, and on the board of directors or gas committee to set up the necessary machinery for transference of suitable young men from laboratory to works. People vary widely in their personal characteristics and it is very desirable that the management should take full advantage of this variation.

There are many chemists who have never shown more ability as chemists than to be able to perform comparatively simple analytical routine operations accurately, but who after translation to the works have reached high positions. Those who aspire to the post of chief chemist should be given periodical experience for a year or two in a production job on the works. We can thus visualize three types of chemist in the fuel industries. One is the *research chemist*, a man who is highly gifted in the scientific unravelling of the secrets of nature and who should be put to work as a research chemist and kept at that class of work throughout his life. The true research chemist will seldom be happy doing any other type of work although circumstances may unfortunately compel him to do so. This does not mean that he is necessarily divorced from the works; on the contrary he should spend a certain amount of his time observing works routine and taking his part in works practice. This, however, should be regarded as strictly for the purpose of training and in general a man will spend his time in investigational work or on the laboratory. The second class is the *works chemist* who is not sufficiently gifted scientifically or interested in his science to wish to remain within the four walls of the laboratory. He is a craftsman rather than an artist and he should spend sufficient time in the laboratory to ensure that he has acquired the fundamental outlook of the chemist, that scientific attitude of mind required for the study of any problem that may be presented to him, and he should then at as early a date as may be possible be translated on to the works to become a production chemical engineer.

The third class is that limited number destined for the post of *chief chemist*. The pure research chemist will seldom make a good chief chemist for he has insufficient of the practical viewpoint in his make up. Similarly the production type of chemist will not make a good chief chemist for he has insufficient sympathy with the outlook of the pure chemist. The chief chemist must partake of the characteristics of both of the other groups. In addition to a general wide acquaintance with his industry he must act, as Sir Ernest has pointed out, as the bridge between research and development. He will control routine testing and works laboratories; he will be present at all meetings of departmental managers on an equality of status in discussions. To quote from Sir Ernest's Address, he will "be the guide, philosopher, and friend of his subordinates, a good team leader, one who encourages his men to show initiative and enthusiasm, and one who shows that he can appreciate the problems of the engineers, the process managers, and the accountants. Such aptitudes can only come with opportunity and long experience, and can hardly be effective if he concentrates unduly in detail on a particular line of his own. The specialists should do that."

A Passing Attitude of Mind

Once there was keen rivalry between engineers and chemists in industry and there was a disposition on the part of engineers to regard the chemist as very small beer. That attitude of mind is passing. The training of the engineer is on different lines from the training of the chemist; but both must converge to a common focal point and that focal point is to achieve the production by the best possible methods and in the most economical way of whatever fuel or whatever other product is manufactured in the works. The civil engineer is necessary to build the works; the mechanical engineer is necessary to build the machinery in the works and to keep that machinery in good running order;

the electrical engineer is necessary to equip the works with power and to see that the power supply is adequate and efficient; the chemist is necessary to ensure that the process operates efficiently. Together these and any other specialists that may be needed, including physicists, form an industrial team which can only operate satisfactorily insofar as it is a team and not a collection of individuals who are intolerant of each other's attitude and slightly jealous of each other's status. One of the primary tasks of any undertaking is to build up a team of this character. Careful selection of men is necessary at the outset but even more necessary is it that the younger men in each branch shall be given an early opportunity of working together to solve their problems mutually and to help one another in every industrial problem that may arise.

Importance of Teamwork

How the several individuals may be made to function as a team is a matter upon which there must be some difference of opinion. It would be ideal if it were possible to insist that the engineer in the course of his training should do some chemistry and that the chemist should do some engineering. A very good foundation can be built on the basis of a mutual understanding of each others' point of view. Differences in technical language are largely avoided if each of the staff has a smattering of the other's particular science. The length of time required for training, however, may make this impossible. In any event there should be means of bringing the younger chemists and engineers right at the outset of their industrial career into continued and close contact with one another. If this can be done upon the social scale outside the works, so much the better. It must also be done inside the works as part of the normal routine. Sir Ernest Smith has referred to meetings of departmental managers; would it be going too far to suggest that there might also be similar meetings of junior members of the staff, under the chairmanship of a senior departmental manager, in which, for the sake of training, the problems referred to the departmental managers were also discussed by the junior staffs?

On a small works such as is now common in the Gas Industry, many of the ideas here discussed are impossible of realization because there is not the scope for sufficiently large staffs or for individuals who have been sufficiently highly trained. Not the least of the changes that is coming about to-morrow will be a different allocation of staff caused through increasing central control and through concentration of production in larger works. While there are many who believe that the small works has much to recommend it there is an increasing belief that the small works cannot cope with modern conditions because it cannot give to the staff the requisite possibilities for training. Sir Ernest Smith has spoken upon the training of chemists in the fuel industries and has pointed out that much of this training comes only with experience—an experience which his chiefs can and should give him. It is our view that although the chemist (and the engineer for that matter) can gain technical knowledge of the fundamentals of his subject by reading and study, the most important part of his training is through experience and that it must be one of the major functions of good management to see that each member of the staff gets the training by which he can profit.

We have said nothing about managerial functions because, as we have indicated on other occasions, it is our view that the function of manager has little to do with the technical or scientific ability of the individual. Technical and scientific ability is largely devoted to the handling of inanimate matter. The managerial function is considerably concerned with the handling of human relationships; and that calls for quite other qualities and perhaps for a different type of training.

Commentary by "Abaris"

Bless Columbus

Occasionally I read American papers and magazines from cover to cover; more often than not I select what I want to absorb and skip the pages that look too romantic, too technical, too dull, or are overloaded with pictures of sizzling and savoury grills.

I read recently that technological developments in gas have outdistanced those in competitive fuel fields and, believe me, I am comforted by that. Miss Helen Kirtland exhorts Mr. Salesman to "use the feminine slant"; and if you want to make your wife look Lana Turner you should "feed her scrambled eggs and toast." Greer Garson on the other hand, appears to be an alarming carnivore in her love of tripe, done the English way. Then there's a gentleman named Mr. Walter Pidgeon who likes a man-sized salad with a two inch thick steak . . . . .

Metro-Goldwyn-Mayer have an imposing all-gas kitchen in their studio for the trifling delicacies I have mentioned; and a chef who is justly proud of his five gas ranges.

There must be many people on this side of the Atlantic who want to know if Mr. Clark Gable and Miss Betty Grable eat winkles or prefer whale steaks; but I, as a gas man, am grateful, in my humble way, that gas is helping to build up these characters gastronomically so that their figures and faces remain full, cheerful, and seductive. Yes, next time I am feeble enough to visit the place called the "Spivoli" and see one of M-G-M's mighty dramas I shall nudge my neighbour in the ribs and cry fortissimo that all the characters in that colossal drama are fed with food cooked to a turn by Mr. Therm.

I make a serious footnote to the foregoing: if people who flock night after night to the cinema have their entertainment curtailed, will they stay at home further to use fuels? As you know, Chancellor H. Dalton, playing in "The Road to Austerity" has upset the descendants of Columbus, *et alia*, and we are threatened with, as it were, a cut-off or capping of American films. Can the Gas Industry organize something attractive for those whose evenings will be barren?

Hin ist Hin

Literally, this is the German for gone is gone. I have used it because Patrick Ryan, who was at one time Publicity Manager of the Gas Light and Coke Company, has now resigned from the British Broadcasting Corporation. It will be generally acknowledged that Ryan did an incredibly good job in gas publicity. It was Ryan, in fact, who fathered Mr. Therm—although many mis-informed editorials have vouchsafed that fatherhood elsewhere; his bright methods put a human complexion on the Gas Industry for the first time in 120 years.

Originality was apparent in all that A.P.R. touched, and particularly in his letters, whence he kept out all the jargon so loved in the Industry. Ult., inst., prox. and other starchy bits of business phraseology are anathema to him; he is a philologist of the first order.

During the war he did a good deal of commenting on the ground in Europe and the East, I am sure at his own request, and after, became Controller of News in Broadcasting House. Rumour has suggested that differences of opinion are the cause of his resignation from what is in fact a job of terrific responsibility; rumour is a lying jade, but she may be breathing a suggestion containing a grain of verity.

Ryan held a key position as chief of home news; news can be either straight or biassed. Ryan would undoubtedly go for the straight stuff. Many in the Government have eyed the Press with dubious eyes, and, in addition, feel that broadcasting should be controlled in their interests; more easily than the Press of course.

A real newspaper man of Ryan's calibre has an honest news outlook, impersonal and non-political. He is joining *The Times*.

The Goose

Those among my readers who have learned Hindustani with the help of one of the late Professor Forbes's books, will recall the story of the old woman who was possessed of a goose that laid a golden egg every day.

There came a time when the old lady thought: "If I increase the food of this goose, then assuredly every day it will yield me two golden eggs." Thus it came about that she fed the goose with as much food as it would eat every day; but the goose, becoming fat, gave no more eggs.

There is a familiar note in this sad story, provided you substitute labour for goose, wages for food, and output for golden eggs. And the old lady? Who can we liken her to? That you may decide for yourself, if you please, for I can think of many who resemble her.

News in Brief

A Cargo of 9,000 tons of coal from the U.S.—the second consignment this month—arrived last week at Rothesay Dock, Glasgow.

It Was Announced on Aug. 29 that the Plymouth Co-operative Society had purchased, with effect from Oct. 1, the retail coal business of the Callington (Cornwall) Gas Company. The Company will, however, continue to conduct its own coke business.

Application Forms and particulars of the Associate Membership Examination of the Institution of Chemical Engineers for 1948 may now be obtained from the Hon. Registrar at 56, Victoria Street, London, S.W.1. They should be returned before Dec. 1.

Bolton Town Council has asked the Gas Committee to reconsider its decision to build new works at Union Road. This has been done, and available sites have been reviewed. The Borough Engineer expressed the opinion that the Union Road site was the only one suitable. The Committee decided to adhere to its original decision.

Complaints Were Made at the meeting of March (Cambs.) Urban District Council about the shortage of coke and other fuel in the town and also that, in spite of the shortage, pressure was being put upon the March Gas and Coke Company by the Ministry of Fuel and Power to send coke out of the town for use elsewhere. The Council decided to instruct their Clerk to complain to the Ministry.

The Alliance and Dublin Consumers Gas Company has extended the hours of evening gas supply until 10.30 p.m. This alteration is intended to help consumers during the holiday season and it is stipulated that if the demand for gas exceeds the Company's manufacturing capacity, the extension will be discontinued. The revised gas periods for both weekdays and Sundays are: Morning, 6.30 a.m. to 2 p.m.; evening, 5.30 p.m. to 10.30 p.m.

The Watford and St. Albans Gas Company offer for sale by tender such an amount of 4% non-cumulative redeemable preference stock as will realize, with premiums, the sum of £169,678 (redeemable at par on July 1, 1967). The minimum price of issue is £100 per £100 stock. A deposit of £25 per £100 nominal stock must accompany a tender and the balance of the purchase money must be paid on or before Sept. 30. Last day for receipt of tenders, 12 o'clock noon, Sept. 18.

An Order for Refractory Materials required for the repair of the upper portions of two vertical retort benches at Dalmarnock Gas-works has been placed with the Woodall Duckham Co. The same Company will also supply cast iron top mouthpieces for vertical retorts at Provan gas-works; and Andrew Barclay, Sons & Co., Ltd., are to provide three sets of link motions for valve gear of small locomotives at the Dalmarnock works.

An Average of 1,850 people a day pass through the Central Hall of the Sheffield and District Gas Company's Main Office in Commercial Street, and it is at this focal point that a new display showcase has recently been installed. The principal object of the new display site is to drive home to Sheffield gas consumers the vital necessity for saving fuel. This month's feature is a display unit produced by the British Gas Council, and a special display of *The Housewife's Code for Gas and Coke Economy* booklet, also a British Gas Council production.

Aberdeen Used More Gas last year than ever before, according to Mr. H. S. Milne, Gas Engineer, whose annual report shows that the output increased by 7.4% to 2,367 million cu.ft. He indicated that part of the winter stocks of coal were dangerously low and for three months during the winter they did not exceed a 10-day supply. The Department decided to alter the calorific value of the City's gas in February, when the Government demanded a 10% reduction in the amount of coal used at the gas-works, and this resulted in the target saving being exceeded by 50%. The amount of new plant introduced and old plant renewed has helped greatly in coping with the rising demand for gas and a substantial increase in revenue from most sources except perhaps the public lighting, is reported. Drawings from credit meters are up by £31,999, and from prepayment meters by £19,635, while coke sales show an increase of £5,135. Revenue from by-products is up by £1,048 and from the sale of appliances by £13,387. Coal, however, cost £34,315 more, wages increased by £15,647, and capital expenditure by £37,222.

Middlesbrough Town Council has applied for sanction to borrow £45,341 in respect of capital expenditure at the gas-works.

Gas at Oswaldtwistle will cost ¾d. a therm more in future, according to Mr. W. F. Metcalf, Chairman of the Gas Committee, who on Mar. 31 reported a deficiency of £1,298.

Hawick Gas Company has announced an increase in the price of gas of 5d. per 1,000 cu.ft., bringing the price up to 4s. 5d. for ordinary meter users, and 14s. 10d. for slot meter users.

Copies of the Grey (Discussion) Editions of I.G.E. Communications No. 302/128 and 303/129 are now available from the Institution of Gas Engineers, 1, Grosvenor Place, S.W.1, price 2s. 6d. per copy (post free).

No Changes in Rates to consumers are anticipated during the ensuing year by the Aberdeen Gas Department provided operating costs remain at existing levels. The Gas Committee estimates a surplus of £13,872.

The Giant Gasholder built at South Gosforth by the Newcastle and Gateshead Gas Company at a cost of £115,000 is expected to be in use in about two months. The 216 ft. wide tank is perfectly circular to within one inch. Water tests have been completed and air tests are nearing completion.

Mr. R. Wilson Bartlett, J.P., D.L. (Chairman of the Company), presided at Newport Gas Company's annual allotments, gardens, and flower competitions at Crindau. He was supported by Mr. G. O. Lloyd and R. S. Snelling (Directors). Proposing thanks, Mr. G. Willey mentioned that the competitions were initiated by the Directors 60 years ago.

The Staveley Coal and Iron Company have acquired the whole of the shares in Beswick's Limeworks, Ltd., of Hindlow, near Buxton. The Board of the Company has been reconstituted and is now as follows: Mr. T. A. McKenna, Chairman; Mr. Percy J. Beswick, Managing Director; Messrs. J. D. Berresford, G. W. P. Beswick, and S. N. Turner, Directors.

Following a Report by Mr. C. W. Dalton, Gas Manager, Arbroath Town Council Finance Committee has decided to make application to the Ministry of Fuel and Power for authority to increase the price of gas by 6d. per 1,000 cu.ft. consequent upon the advance in price of coal, railway, and carting charges. It was recommended that the increase take effect as from May 15, 1948, but after discussion it was agreed to defer consideration of the effective date of increase.

The Prescot and District Gas Company featured the Demonstration House of the United Kingdom Gas Corporation at a recent Housing Exhibition organised by the Whiston Rural District Council. The Exhibition was opened by Mr. C. N. Shawcross, Member of Parliament for the Widnes Division. In the houses built by this authority a complete gas installation is provided. The choice of fuel for cooking is left entirely to the tenant but it is interesting to note that of the houses occupied to date 98% have chosen gas.

Gas Helped with the Harvest in east Hampshire recently when the Bordon Branch of the Farnham Gas and Electricity Company supplied gas equipment to cook for a harvest camp organized by the Hants W.A.E.C. The campers were girls from Latymer's School, Edmonton, N.9, who spent a most successful fortnight at Headley Mill Farm, Standford, Bordon, assisting local farmers with their harvest. The camp catering staff agreed that the facilities of gas cooking—rarely found under camping conditions—contributed in no small measure to the success of the undertaking; and they hope to visit the site again next year.

At Perth, increase in the price of coal will add £10,000 to the cost of running the Gas Department, and £3,750 will be added by higher transport charges. Largely because of the long spell of warm weather, domestic consumers have been using less gas this summer, and for the first time in 10 years there has been a drop in the output from the Gas Department. This decrease in output, permitting a saving in coal supplies which will be useful for the winter, is partly due to an increase in the number of appliances which people have been buying in recent months. Prior to 1946, the value of appliances sold by the Department was about £6,000 a year. Last year the sales valued £24,000 and in the past six weeks appliances worth £6,000—as much as was previously sold in a year—have been purchased. The Department is dealing with 20,000 enquries per annum.

CORK GAS DISPUTE

Employees of the Cork Gas Consumers Company took unofficial strike action on Aug. 16, without warning, leaving the city without gas. The men had been invited to attend a conference a few days ahead to clear up certain matters in relation to the strike in July and to discuss a new agreement. The men thought that the question was being delayed too long. The matter was referred to the Eire Labour Court.

At a special meeting on Aug. 17 the strikers decided, by a majority, to resume work on Aug. 18.

When they went back to work they were told that the gas-works would remain closed pending a meeting of the Directors to decide on what conditions work might be resumed. Later in the day, the Directors announced that in view of strikes and constantly recurring threats of strikes, the Company had decided that the gas-works would not re-open unless the workers' Union signed a draft agreement which had already been submitted to the Union.

A statement issued on behalf of the workers said that the Union had been invited to a conference fixed for Aug. 22, provided that the lightning strike was discontinued. The Union felt that the Company was substituting the weapon of lock-out instead of allowing negotiations to proceed in the normal course, and for this reason the Union officials would not be instructed to sign the draft agreement.

Later the Directors informed the Union involved in the strike that they were instituting proceedings under the Conspiracy and Protection of Property Act, 1875. They had rejected an offer of arbitration by the President of University College, Cork, and the Very Rev. Dr. Hegarty, on the ground that this would serve no useful purpose and might even do more harm than good.

On Aug. 29 it was announced that the dispute had been settled. The workers accepted final proposals by the Company for a settlement and arrangements were made for an immediate resumption of work.

LECTURES ON FUEL ECONOMY

"Fuel Economy in relation to Steam Generation and Steam Utilization" is the title of a course of lectures to be given at the Northampton Polytechnic, London, E.C.1, during the coming autumn. Section A, on "Principles of Combustion and Properties of Steam," commences on Oct. 47 and comprises seven lectures on Tuesday evenings. Section B, on "Steam Generation," begins on Nov. 25 and comprises ten lectures on Tuesday evenings. Section C, on "Steam Utilization," starts on Nov. 27 and comprises ten lectures on Thursday evenings. Fees for the various sections are as follows: A, 10s.; B, 12s. 6d.; C, 12s. 6d. Another course of 10 lectures on "Refractories—their Production, Properties, and Uses," will commence on Oct. 8, the lectures being given on Wednesday evenings.

Admission to the courses, which have been arranged by the Department of Applied Chemistry, is effected by personal enrolment at the Polytechnic Office any day between 10 a.m. and 7 p.m.

NEWS IN BRIEF

(*Contd. from p. 556*)

Bairds & Scottish Steel, Ltd., have been able to supply much more coke oven gas than they anticipated in 1942 when they entered into the agreement with the Glasgow Corporation, and as a result an additional motor-driven compressor and a spare motor similar to those already installed were required to augment the present transmitting capacity. George Waller & Son, Ltd., Stroud, are to supply the compressor, while motors will be of British Thomson-Houston, Ltd., manufacture. The latter firm will also carry out the installation at a cost of approximately £10,500.

New Ideas for Recipes and hints on food and fuel economy comprise the programme for a series of weekly cookery demonstrations to be held throughout September in the Winchester showrooms of the Southampton Gaslight and Coke Company. Among the interest in subjects to be covered in this series of demonstrations are tomatoes—bottling, chutney, and jam; cocoa cookery; entertaining snacks; and, particularly attractive to the housewife these days, dinners off the ration. The Company are also organizing this month in the Winchester Guildhall a special homecraft course.

Kelty Gas Company recently staged an exhibition of the latest type of gas appliances which was very well patronized. The exhibition was opened by Mr. John Sneddon, Convenor of Fife County Housing Committee, and the platform party consisted of Mr. Colin Terris, J.P., Chairman, Mr. E. G. Smith, Engineer and Manager, Dunfermline Gas Department, and the Manager and Directors of Kelty Gas Company. An attractive assortment of cookers, space heating appliances, and water heaters was on show, and during the run of the exhibition interesting demonstrations on fruit bottling and cookery snacks were given by the Ministry of Food representatives.

Preparatory Work is in progress at Airdrie Gas-works to increase the existing carbonizing plant capacity by an additional eight retorts. Altogether, about £50,000 is being spent on new plant, which includes a new water condenser, an electrostatic detarrer, a static washer, and a waste heat boiler. Provision has also been made for a new messroom with lockers and washing facilities costing £2,000. To meet the ever increasing demand for gas on the district, an extensive main-laying programme is now well in hand, and this will include the conversion of a trunk main to high pressure, which will supply the outlying districts several miles from the works. Airdrie Gas Department recently opened a new showroom in Graham Street.

Following a Breakdown at the works of the Falkirk Gas Department when domestic supplies were almost entirely cut off and industrial work was slowed down, an official statement has been issued by Mr. W. Ewing, Engineer and Manager. Main causes of the disturbance in its initial stages were a serious temporary shortage of skilled retort plant operators and an outbreak of fire in the coal hoppers feeding the gas-making retorts. This was further aggravated by the type of coal available and the fact that the steady increase in gas consumption in the area has made almost non-existent the reserve plant which would normally have met such an emergency. New carbonizing plant has been on order for a long time, but it is said this cannot be installed for over a year.

Diary

Sept. 11.—North British Association of Gas Managers: Annual General Meeting, Town Hall, St. Andrews. (Golf and bowling competitions, Sept. 10; annual excursion, Pitlochry, Sept. 12).

Sept. 12.—Manchester District Association of Gas Engineers: Visit to Stanton Ironworks, near Nottingham.

Sept. 15.—Women's Gas Council: Executive Committee, Gas Industry House, 1 p.m.

Sept. 15.—London and Counties Coke Association: Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m. Gas Industry House.

Sept. 15-19.—Association of Public Lighting Engineers: Nineteenth Annual Meeting and Conference, Southport.

Sept. 16.—National Federation of Gas Coke Associations: National Technical Committee, Gas Industry House, 11.30 a.m.

Sept. 16.—B.G.C. Gas Salesmen's Circle (Scotland, Western District). Meeting at Ascot Gas Water Heaters, Ltd., 137, Sauchiehall Street, Glasgow, 5 p.m. Paper by R. J. Gregg "Survey for Salesmen."

Sept. 16.—Solid Smokeless Fuels Federation: Technical Committee, Gas Industry House, 2.45 p.m.

Sept. 18.—Industrial Gas Development Committee, South Metropolitan Gas Company's Offices.

Sept. 20.—Manchester and District Junior Gas Association: Extraordinary General Meeting, Gas Showrooms, Manchester, 2.30 p.m.

Sept. 23.—Midland Junior Gas Association: Joint Meeting with Midlands District Gas Salesmen's Circle for Annual President's and Chairman's Day, Birmingham.

Sept. 24-25.—Institute of Statutory Inspectors of Gas Meters: Annual Conference, Royal Pavilion, Brighton. "History and Development of Wet Meters," B. R. Parkinson; "Gas Meters in the British Zone of Germany and in Berlin," M. W. Jones (Gas Testing Branch, Ministry of Fuel and Power).

Sept. 26.—North of England Gas Managers' Association (Auxiliary Section): Autumn Meeting, visit to Monkton Coke and Gas-works.

Oct. 1.—B. G. C. Domestic Development Committee, Gas Industry House, 10.30 a.m.

Oct. 1.—Wales and Monmouthshire Association of Gas Engineers and Managers: General Meeting, Llandrindod Wells (preceded on Sept. 30 by Golf Competition on Llandrindod Wells Golf Course).

Oct. 2.—Solid Smokeless Fuels Federation: Executive Committee, Dorchester Hotel, Park Lane, W.1., 11.30 a.m.

Oct. 20.—London and Counties Coke Association: Annual Luncheon 1 for 1.15 p.m.; Annual General Meeting, 2.45 p.m. Grosvenor House, Park Lane, W.1.

Oct. 25.—Yorkshire Junior Gas Association: Annual General Meeting, Royal Victoria Hotel, Sheffield, 2.30 p.m.

Oct. 28.—Southern Association of Gas Engineers and Managers: Annual General Meeting, Connaught Rooms, Kingsway, London. 2.30 p.m. (Preceded by Council Meeting, 11 a.m.; Luncheon, 1 p.m.)

Nov. 25-26.—Institution of Gas Engineers: 13th Autumn Reasearch Meeting, London.

CARBONIZATION IN HORIZONTAL RETORTS

(A Communication from the South Metropolitan Gas Company)

By L. MUIR WILSON, M.Sc., A.R.I.C.

The Southern Association of Gas Engineers and Managers has asked the South Metropolitan Gas Company to give a Paper on the subject of Scrubber Standpipes early in the New Year of 1948. This opens up a very big subject because it will at once be asked: "Why do we put scrubber standpipes in?" We install them because we like them and we like them because they fit in with our ideas about carbonization in horizontal retorts, so we are explaining our general ideas here as a preliminary to the Paper to be read in January of next year, by L. Muir Wilson and E. A. Laundy. This course will leave more time for a detailed description of our scrubber standpipes and for the discussion.

THIS article is a sequel to other papers: (1) "Fuel Economy in the Gas Industry"; Southern Association, 1939. (2) "Furnace Design"; London and Southern District Juniors, 1943. (3) "The Stability of Heated Structures"; Southern Association, 1945.

Horizontal retorts cost a lot of money to build, much too much money nowadays, and many highly paid men are employed on them, so we cannot afford to have either the men or the plant doing nothing. In any case, we have little enough spare plant nowadays, when it seems impossible to get renewals or repairs done in reasonable time. There is only one answer to all this. We must make as many therms per retort per week as possible, provided that coal is not wasted by under-carbonization, for coal, like everything else, is in short supply. A high make per retort and a maximum make per ton go hand in hand until we reach about 95% of the maximum possible make, so, unless demands are very heavy, it pays to stay at about this figure.

The first essential is to work the plant at full capacity for seven days a week. Incidentally, this saves coke and a lot of damaging up and down work. Some up and down work is unavoidable, but the less the better. Seven days a week all the year round is too much for the men, but the six-day week, which pays everyone, is the cure for this.

The next thing to do is to make quite sure that every retort can be and is absolutely cram-full of coal. The first essential for this is a good charging machine which stems the coal right home and the second essential is to have the retorts absolutely free from scurf. This wretched and much revered material while it is clinging to the retort walls has absolutely no virtue whatsoever, but does real good when it is stopping up cracks and joints. So long as there is a tendency for gas to flow from the retort to the combustion chamber, the filling up of reasonably sized crevices is quite automatic—a reasonable size may be half an inch—so a relentless and continual war can be waged against the main body of the scurf without impairing gas tightness. Retorts are clean when all the joints between the segments can be seen. The first thing to do is to keep the retorts so full of coal that there are no free spaces in which gas can hang about and deposit carbon, and the second thing is to keep on burning off carbon as fast as it forms. There must be a regular scurfing programme, but bars should never be necessary, and no departure from the programme should be permitted however serious the gas position. Departure can only result in temporary relief, leaving a state of affairs which will take so long to clear up that there will be an overall loss in output. Scrubber standpipes do much to help in this respect because it is so easy to close the flap valves on retorts which are off for scurfing, whereas ordinary ascension pipes may have to be plugged in some way, though plugging should not be needed if level gauge can be maintained in the mouthpieces. In some draughty retort houses there is always enough natural air movement to keep down the scurf if both doors of the retorts are left open, but in other houses it is necessary to rig up air injectors or small electric blowers. Some mechanical means is best because it saves time and so increases output.

A comparatively thinly coated retort can hold enough scurf to displace a hundredweight of coal; this is mischief enough, but there is worse to come. Of its many crimes, scurf raises the inside surface temperature of the retort. Siliceous retorts are always softish when hot and the less distance this soft state penetrates from the chamber side inwards, the less the tendency to distort. The scurf itself can set up pressures which aggravate distortion because the scurf and the retort material have different coefficients of expansion, so carbon is deposited between the already formed scurf and the retort proper and there is a suspicion that as the change takes place from one modification of carbon to another very powerful forces are released.

It may be thought that an absence of scurf in retorts makes them bad to push and so at least a thin layer is necessary. Because this is partially true and partially untrue, confusion of thought arises. The real truth is that scurf is one of the causes of stickers. It first causes the retorts to become a bad shape and then makes them easier to push because it helps to level out the bumps which it had caused. If new retorts are never allowed to grow scurf, it will be very many years before such a remedy will be needed.

Retorts are less inclined to stick if always pushed one way, because they wear with a taper towards the discharge end. Heavier charges sometimes push out better than lighter charges and badly-shaped retorts, which stick, may push better when the weight of charge is considerably increased. Underdone charges stick for obvious reasons, but overdone charges can also stick; the charges which come out best are those which are burned off to about two or three therms per ton in the coke. The explanation of these observations is, possibly, as follows: A light charge tends to be over-coked so that the coke is not only small and mushy, which allows the pusher head to plough into it and become jammed, but also the light charge heaps up and chokes the mouthpieces at the discharge end. The same sort of thing happens when a coal of poor coking power is used and it may have had its coking power reduced by too long a stay on the stock heap. While on the subject of pushers, it may be stated that we do not favour the type of machine which has its head resting on the retort bottom. This arrangement can cause serious wear and damage.

The best results seem to be obtained by filling the retorts from both ends simultaneously and discharging from one end only, so all our new settings have the fleuve and producers on the same side—an arrangement which is not too difficult to fit in.

It seems that, if methane and the like are not being turned into scurf in the free spaces of badly filled retorts, tightly filled retorts should show the best therm yields. They do, if records over many years mean anything, but the volatile therm content of the coke must be the same where comparison is made.

Retorts with big holes in them will never give a good therm yield, so they should be kept in a good state of repair. All the same, retorts which are worked under pressure the whole time seldom develop holes. It is the pulling in of hot airy waste gases which turns small crevices into holes, but it is not the slightest use making a rather futile attempt to maintain exactly level gauge in the mouthpieces in the hope that nothing will go either way. This is primarily because the pressure in a newly and properly filled retort at a point a few feet in is well over 10 in. water gauge and it stays at a high figure for some hours, so an odd tenth or two either way in the mouthpieces can have no useful effect in this respect.

We now know much more than we did about this magnitude of the pressures which exist in the middle of retorts. The first evidence came from some old inclined retorts which had only one ascension pipe situated at the lower end. When these retorts were filled so that there was no free space over the coal the pressure in the top mouthpieces rose to about 18 in. water gauge and stayed very high for an hour or two. The highest ever recorded was 28 in. If there had been an ascension pipe at each end, it would have been fair to conclude that the pressure half way through the retort was about half those mentioned. We get similar results when one of the two ascension pipes on our ordinary retorts is stopped. For this reason, we decided, when we first fitted Congdon pipes that we must have them at each end of the retorts.

This evidence satisfies us more than attempts which have been made to measure pressures by poking tubes into the coal during the process of carbonization. It may fall short of the truth because, when the plastic layer is forming or has just formed, almost in contact with the retort walls, the gas generated between the layer and the wall may be at atmospheres pressure; this pressure is only local but at a vital point as regards leakage, and if it were extended throughout the whole retort the vessel would burst.

At a station where all the retorts are equipped with Congdon pipes we set out to do an experiment for quite a different purpose, which we did not achieve because of unexpected and interesting results. The results produced further evidence on the subject of resistance to flow of gas in retorts and the magnitude of the pressure set up.

Gaseous Therms from Oil Cracking

We attempted the experiment because we believe that a large proportion of the gaseous therms come from the cracking up of oils in the already heated portions of the charge. Perhaps the oils from the ends of the charge are insufficiently cracked since they have only a short distance to go. So why not pass the gas from newly charged retorts through retorts nearly ready for pushing If the gas entered the second retort not only loaded with light oil but saturated with water vapour at 80°C., there was a possibility that gas therms would be produced both from the oils and as water gas. The water gas reaction might also help to keep down scurf.

All we had to do was to close the connexion between the top of one Congdon uptake pipe and the collecting main, then all the gas given off from the newly charged retorts, at the end where the pipe was closed, could only get away by passing through nearly finished retorts. The next stage would have been to close the flap valve on the newly charged retorts at their opposite ends. Then all the gas from them would be subjected to retreatment. We ran into trouble before we got this far because the 10 in. footseals blew on the side where the Congdon uptakes were closed. How much higher the pressure would have gone we do not know. We learned two things—(1) the pressure at the middle of a newly charged retort is well over 10 in. water gauge, and (2) the resistance of a well filled retort when ready for pushing is remarkably high. We had imagined that the coke would have shrunk sufficiently by this time to allow all the gas to get away easily. The ends of the burned off retorts were slightly darkened from the direction where the gas entered, so there must have been some flow.

It seems that we will have to repeat our experiment with retorts not full up to the top, and then the results may not be much good.

We can regard the bottom of a coke oven as being as far away from the gas passage at its top as the middle of a retort is from the mouthpiece. Thus, we may expect the pressure at the bottoms of newly charged ovens to be of about the same magnitude as in the middles of newly-charged, well filled, retorts. Pressures at the bottoms of ovens, so we are informed by friends in America who have studied the problem, rise as high as 200-300 mm. water gauge. Thus the expectation may be justified because 250 mm. is equivalent to 10 in. water gauge. These high pressures do not necessarily occur just behind the doors, probably because the coal packs less closely in the corners, so the problem of keeping tight doors is not as difficult as it might seem. Nevertheless, the oven brickwork has to withstand considerable pressure and it is no use imagining that a reduction of one or two millimetres of pressure in the collecting mains can do much to reduce initial leakage of gas to the heating flues just after charging. The only way to prevent this leakage is to keep all joints safely sealed with carbon and, in order to keep the carbon seal, pressure must be maintained in all parts of the oven at all times, particularly just before pushing out, or, when the carbon is most needed, it will not be there. It cannot be over-emphasized that carbonizing vessels need to be tightest just after charging, for this is the time when the richest gas is made and the most therms are often lost. The biggest pressures are encountered at the bottom after charging, but at the bottom the carbon is most readily destroyed because the natural buoyancy of the hot coal gas causes pulls to appear here sooner than anywhere else.

Pressure Resistance

The question may be asked how is it that retorts can resist the considerable pressure which occurs in them from time to time? One might doubt whether the retorts, made up of segments or fragments as they are, can withstand very much, and so believe that it is the weight of superimposed brickwork pressing on the cross walls which resists the internal pressures. However, the top retorts of our settings, being independent of the covering arches, carry very little more weight than the weight of their own top segments and yet they seem capable of withstanding pressure just as well as the lower retorts. This is illustrated by an interesting happening.

On one occasion, a top retort had both its ascension pipes completely stopped up (we had Italian labour at the time). Gas, well afire, was roaring past the door faces with a sound as loud as a boiler blowing off. The doors were fitted with automatic catches and, since it seemed likely that anyone opening the door in the proper way might be burned, someone knocked up the catch. The door flew back and about two hundredweight of coal, coke and plastic layer were splashed out against the retort house wall with a nearly flat trajectory. If the small volume of gas in the charge could do this, then its pressure must have been considerable, and it was fortunate that it was a top retort, otherwise several people might have been knocked flat. Anyway, the retort had suffered no damage. None of this explains how retorts resist pressure. It only emphasizes the fact that they can, and do, resist very high pressure indeed. Perhaps the carbon in the joints has adhesive properties which enables the retort to withstand tensions which must be of a high order when one considers the circumference of such a large tubular vessel. There must also be a considerable end-to-end force which is ultimately transmitted by the binders to the buckstaves.

When a retort is brought up from cold for the first time, whether it is a new or an old one, gas pours through the cracks and joints into the combustion chamber. This looks very frightening, but one must have the courage to do nothing but wait while maintaining pressure in the mouthpieces. The outgoing gas will soon deposit enough carbon in the cracks to seal them. Even with 2 in. pressure in the mouthpieces new retorts usually come right in about 20 minutes and old ones with about one-tenth pressure in the mouthpieces heal up in less than 12 hours. If vacuum exists in the mouthpieces it will not affect what happens in the main body of the charge until nearly the end of its time, then waste gases will be pulled in to undo all the good by removing the deposited carbon from the cracks and joints, so the process will have to be done all over again when the next new charge goes in. It should be remembered that hot CO_2 is quite a good solvent for carbon. It is better to keep nothing less than one-tenth inch water gauge of pressure in the mouthpieces. This is a very good practice when collars and mouthpieces are inclined to be leaky, they show up and get seen to, far better than living in a fool's paradise and imagining, when vacuum is maintained, that what cannot be seen does not exist. Leaky mouthpieces may show up when retorts are working under pull, perhaps just after charging and especially when the pipes are inclined to be stopped, but they are far more obvious when pressure is maintained. A leaky mouthpiece may let in about five times as much clean air as it will let out tarry gas and both represent about the same loss of therms. When this air burns inside the mouthpiece it causes stopped pipes, one of the principal hindrances to good outputs.

Loss and Unnecessary Smoke

Stopped pipes are great fun as everybody knows and ascension pipes are apparently expected to function in disregard of the laws of gravity by making the liquids which condense out in them run uphill. Of course, they do no such thing. The heavy pitch and tar which come out first reflux down into the mouthpieces to make a sticky mess. This represents a loss of products and makes a lot of unnecessary smoke when the retorts are pushed out and sometimes causes tar burns to the men. At first the gases are relatively cool, but towards pushing time they are hot enough to bake the descending condensates into an objectionable paste. When nothing worse than this happens the pipes can be kept clear by regular augering, but if the baking is carried out at a higher temperature by the combustion of air, which is being drawn in through bad doors and the like, really hard coke and oxidation products block the bottom of the pipe and augering may only have the effect of pushing them up out of reach.

There are two diametrically opposed cures for refluxing in ascension pipes. One is to keep the pipes so hot that condensation cannot take place. In coke oven practice the pipes are internally lagged with firebrick and the small accumulations which do occur can be burned off by passing hot air from the oven out of the cap of the pipe while the oven is empty. The alternative is to cool the gases as soon as possible and divert the products so that they do not run back into the retorts. This is Congdon or Scrubber Standpipe practice as applied to horizontal retorts. Here the short connexions between the mouthpieces and the standpipes tend to block, due to a very small amount of unavoidable condensation, but the connexions are short and need not be of more than three inches bore, so a man with a light auger is heartened by the thought that once he had pushed the valve back he has really done his job and the material augered out drops into the footseals. Strangely enough, both methods are adiabatic and so throw a heavy load on to the condensers.

For a slab-shaped charge of coal there is an optimum width which gives the maximum throughput. In theory the narrower the width the better because of the effect of the inverse square law, which has been discussed on previous occasions, but in practice it is undesirable to go below a certain width because it brings about all sorts of complications as well may be imagined. Likewise, there is an optimum cross-section for horizontal retorts, but the issue is not nearly so clear cut as for an oven because here heat flow converges toward the centre. All the same a retort of twice the cross-sectional area of another takes more than twice as long to burn off, so long as the section is fairly round. Our standard retort is oval in section, 21 in. on the horizontal axis, 15 in. high and 20 ft. long, and it has a better throughput than a similar retort 25 in. wide and 15 in. high. A smaller retort might be slightly better but we have never tried one. As it is we have our work cut out to provide enough producer gas to keep these retorts (21 in. by 15 in.) going full out, when we fill them properly, and we would need more producer gas still if we endeavoured to do the work in less time with smaller

retorts. The problem would be to find room for bigger producers under the settings and refractories to resist the higher chamber temperatures needed to force the heat into the retort in less time because the heat input is in direct proportion to the throughput of coal.

We normally work our retorts on a 10-hour schedule with 1,360°C. in the combustion chambers. So long as throughput is maintained it seems difficult to get the temperature much higher, but the settings are like ships under a great press of sail and running close to the wind, there only need be a hold up and temperatures can run away alarmingly when so much gas and air is being used. Probably it is difficult to do serious damage to a setting so long as the work is increased to check temperatures and the charges are pushed out on time, but there must be a slight increase in combustion chamber temperatures although the inside retort temperatures, on which the stability of the retorts depend, do not rise in proportion.

Recirculation

There is a certain expedient, which can be resorted to when gas is in great and sudden demand, but first of all it is necessary to explain why we are getting on rather slowly with recirculation. It seems to make our settings difficult to regulate, somewhat sluggish and unresponsive. We think it helps throughput, but we think it increases fuel consumption slightly. The position is a bit nebulous at the moment, but it is still receiving attention. It needs a year or two of careful observation before we can draw definite conclusions. The idea behind it all is to increase jack arch temperatures without increasing combustion chamber temperatures, for we normally keep these close to their safe upper limit. With recirculation our trouble is to keep the combustion chamber up to 1,360°C., so what we lose one way we do not entirely gain in another. The difficulty is to provide all the extra producer gas and air required.

We understand how the inverse square law relates the width of an oven to the rate of carbonization so long as the inner face temperature of the oven is kept constant, but we do not understand quite how the rate of carbonization is related to temperature, except that the higher the temperature the faster the process goes. When we come to consider combustion chamber temperatures, rather than retort inner face temperatures, we have to think about the conductivity of the retort material and the effect of its thickness. This is a subject which needs a great deal of careful attention by someone with plenty of time. It is, however, quite clear that the less distance heat has to travel, the more effective it will be, so on the bottom retorts where the centre of carbonization is well over towards the jack arch side, an increase of 50°C. here will be more effective than an increase of 50°C. on the chamber side. This is just an application of the inverse square principle.

One effective way of raising the jack arch temperature is to design the settings so that a very large excess of secondary air can be used—say, an excess of 100% while maintaining the combustion chamber temperature constant. This will not result in the jack arch analysis showing an excess of 100% air, because some more producer gas—probably 30-50%—will be needed to counteract the cooling effect of this excess air in the chamber and to do the extra work less efficiently. The result will be a much greater flow of gases through the setting and more heat carried over to the jack arches. This method is very wasteful in fuel, but as a temporary measure may economize in fuel, because it takes a lot of coke to keep settings standing by or to heat them up in a hurry; these may never be needed or may be ready too late. If there is no spare plant at all, which is often the case nowadays, there can be no argument. Recirculation, on the other hand, wastes a little fuel all the time.

We have tried this excess of air method on some settings where we had plenty of chimney draught, plenty of room for secondary air and a large number of outside producers available. We succeeded in raising the jack arch temperature by 80°C. The result was that the 25 in. by 15 in. retorts, which never did much better than 12-hour work, came off in nine hours twenty minutes and showed a 30% increase in thermal output with reasonably well carbonized charges. It would be difficult to make the producer power needed available with in-built producers which we favour, but the account may be interesting and may help to set someone thinking.

One of our troubles to-day is that the coal contains nearly 50% more ash than it did and it is the ash which causes nearly all the resistance in a gas producer. This increase no doubt slows down the possible rate at which producer gas can be made by as much as 30%. It is unfortunate that things should turn out like this when we want more from our plant than ever before. In some sections we are running so close to the wind with our gas producers that we have only to get some slightly worse delivery of coal and trouble overtakes us in the form of excessive clinker, usually in the middle of the night, or at some awkward time. This only emphasizes the fact that built-in producers can scarcely be too big, and it is certainly true, though all the reasons are not so obvious, that our settings with the largest producer reserve do the best.

Retort House Testing

(1) *Combustion Chamber Temperatures.*

These should be taken for two reasons—(a) to ensure the safety of the plant, always remembering that an excessive temperature has only to be scored once and the damage is done; (b) to ensure that the specified working temperature is being strictly adhered to. Maximum throughputs will never be obtained unless a very close average is obtained. A wide average is useless, because the coolest settings set the pace for the others.

Every bed should be designed and maintained so that the combustion chamber is at the same temperature from end to end and every bed must be heated to the same degree as its neighbour. Hot spots mean slow work, because the rest of the bed must be kept cooler than it should be.

If 1,360°C. is laid down as the working temperature then it is proper to reduce 1,380°C. and increase 1,340°C. An average of 1,360°C. between 1,410°C. and 1,310°C. means that some of the settings are kept in jeopardy at 1,410°C. to no purpose, while the carbonizing rate is only proportional to a temperature of 1,310°C.

(2) *Inert Tests.*

When a house is worked always with pressure in the mouthpieces, the inerts in the coal gas will be only those which come from the coal, so there is not much point in an inert test, except to make sure that instructions are being obeyed. Of course, the finished gas, to which diluent has been added, must be analyzed, but this is a different matter.

(3) *Waste Gas Tests.*

The waste gases should be tested and should contain 20% of carbon dioxide at the jack arch and no carbon monoxide. Under such conditions the fuel consumption will be at a minimum and if waste heat boilers are in use they should make the maximum amount of steam, provided that there is no air infiltration before their inlets. A test should be done to make sure that no air is leaking in.

(4) *Test for Total Oxygen in Waste Gas.*

To do a test for a deficiency of total oxygen in the waste gases is a waste of time because it will never reveal a loss of coal gas from the retorts which is not apparent to the eye by looking into the combustion chambers or up at the top of the stack. Stacks are very important, they should be constantly observed. So long as they are perfectly clear, one can be assured that no black ends, due to bad backing up or bad charging, or underdone charges are going into the producers and that the retorts are not leaking, provided jack arch analyses are adjusted before filling retorts and not just after. If they are clear before filling the producers and not after, it is easy to tell where the smoke comes from. The idea of this test for oxygen deficiency is sound enough in theory, but one is never likely to be looking for much more than four therms per ton of coal, even supposing that the escaping coal gas was all hydrogen, it would be like looking for a needle in a haystack to detect the loss of oxygen in the large volumes of waste gas. To complicate matters, the waste gases obtained from uncontaminated producer gas are deficient in oxygen because some is turned to water by hydrogen in the coke, and some remains in the ash. To sample the producer gas accurately and simultaneously with the accurate and simultaneous sampling of the waste gases is nearly impossible, and to analyze the resulting samples with a sufficient certainty for the detection of such very small differences would be a most extraordinary undertaking.

Here is an example which can be worked out in one's head: A setting carbonizes 15.6 tons of coal per day and four therms of coal gas are being lost per ton. The volume of a therm is about 200 cu.ft., so 12,500 cu.ft. of coal gas are being lost every day. The coke consumption is 16% or 2.5 tons of coke each day, producing a waste gas volume of 800,000 cu.ft. per day at N.T.P. We can assume that one volume of coal gas is the approximate equivalent to one volume of hydrogen for the purpose of our calculation. Every volume of hydrogen will cause half a volume of oxygen to disappear, so 6,250 cu.ft. of oxygen in the waste gas will be turned into water and lost; this is equivalent to only 0.75% of the total volume of waste gas.

(5) *Testing Retorts for Tightness.*

Air is sometimes pumped into hot retorts to test them for gas tightness and we learn that they are not air tight. Air is the best solvent for hot carbon, which seals the cracks in the retorts, so we might as well pour sulphuric acid into a tall hat and conclude that it is not watertight. This may be true if there is a ventilation hole in the hat; it would have been more

scientific to have looked for the hole first. Testing cold retorts is no use in any circumstances. One expects to find open joints in any cooled-off retorts. These come about by contraction on cooling and if they were not there the setting could not be reheated without damage.

(6) *Test for Volatile Therms in Coke.*

The volatile therm content of the coke should be tested. Samples should be taken from coke quenched immediately on pushing; if it has been afire for an hour or even a minute the result is not likely to be of much guidance to the retort house operators although it may be a warning to the consumer.

(7) *Testing Producer Gas.*

With built-in producers there is not much to be gained by a routine test of this nature because all forms of heat generated find their way into the setting.

Results

Coals which were expected to give about 75 therms per ton before the war should now yield about 72 due to the increased quantity of dirt which they contain.

When we carbonize with a pressure of one-tenth inch water gauge in the bottom mouthpiece, kept constant by means of an Askania regulator in conjunction with Scrubber Standpipes, we have about two-tenths inch water gauge in the top mouthpieces, due to the buoyancy of the warm gas. Under these conditions to-day we can get 71.5 therms of coal gas including benzole. Of course the tar yield is better than where ordinary ascension pipes are used. The tar is greater in quantity by about one therm per ton, the specific gravity is slightly higher, more free carbon is present, and the fraction boiling at over 300°C. is greater. This is all as one would expect.

The make of gas per retort per day seems fairly steady at 112 therms and can be pushed up, by increasing combustion chamber temperatures to 1,375°C., to 120 without exceeding 2.5 volatile therms in the coke. These clay-bonded silica retorts, which are more refractory than our normal siliceous though no better as conductors of heat, are 21 in. by 15 in. by 20 ft. long and probably not more than 17½ ft. is occupied by coal, so if the length was increased by 2 ft. the extra coal content would be somewhat better than 10%. This should be borne in mind when comparing those retorts with others of a different length. For instance, a 25 ft. retort would contain $\frac{5}{17.5}$ more coal. These 20 ft. retorts of ours hold an average weight of charge of 13.4 cwt., but this includes 5% of the number of retorts which are left open for two hours for scurfing, after this they are lightly charged because they will have to be pushed out in eight hours instead of 10 hours, so as to bring them on to schedule. Thus the actual weight of charge burned off in 10 hours in the fully charged retorts is about 14 cwt., which is a very full charge indeed for such a small retort.

We do all we can to take away from the men the idea that they are doing futile work, such as wheeling barrows when tractors should be used, poking pipes which ought never to be stopped, and using shovels when excavators should be used. These things may not appear to pay on paper, but the financial gain can be great because work is always done better by men who feel that their labour has some dignity above that of a donkey.

The success of a winter campaign is finally decided during the previous nine months, during which men must be trained, stock heaps built up, the plant got into the best possible state of repair, and much hard thinking done by those responsible. Last-minute instructions and changes of plan only cause confusion at a time when things ought to be going with clock-like precision and only serve to emphasize that there has been a lack of foresight. During the peak of the production drive it is too late to get worried about the present, but mistakes and oversights should be carefully noted with a view to avoiding them in the future.

This account of recent developments in the practice of horizontal retort working is published with the permission of the Directors of the South Metropolitan Gas Company in the hope that it may be of use and interest to others in the Industry.

Reprints of this article will be available shortly and will serve as a basis for the Paper to be read at the January, 1948, meeting of the Southern Asssociation of Gas Engineers and Managers.

ENGINEERING AND MARINE EXHIBITION

Another star of peace appeared in our post-war sky on Aug. 28, when there opened at Olympia the Engineering and Marine Exhibition, which will remain open until Sept. 13. Naturally the exhibition is designed to appeal to the overseas buyer and the response has been impressive, firms in 34 countries, Empire and foreign, having accepted invitations; 25,000 overseas visitors are expected to attend. The exhibition has the active support of the British Engineers' Association (Incorporated), the Society of Motor Manufacturers and Traders, Ltd. (Marine Section), the Foundry Trades' Equipment and Supplies Association, Ltd., the British Electrical and Allied Manufacturers' Association (Incorporated), the Institute of Welding, and the British Acetylene Association. During its run it will be visited by some 70 trade and technical institutions and associations.

For the first time in its history (it commenced in 1906) the exhibition occupies the whole of the Grand and National Halls at Olympia, including their large Galleries, an addition of nearly 50% of its largest pre-war size. There are added on this occasion a new section for heavy electrical exhibits and demonstrations of machine tools. It constitutes the largest demonstration of mechanical and marine engineering products, foundry equipment and welding plant which has in all probability ever been gathered together on one occasion in the course of history.

Government Departments

In addition to the many firms represented at the exhibition, four Government Departments have stands. That of the War Office is dominated by a 20 ft. Bailey bridge erected on 20 ft. piers, as well as a mine-detecting display in which the public are invited to participate. An airborne trailer workshop and a wireless repair and test shop are also of particular interest. The Admiralty is also represented by a stand illustrating 100 years of naval engineering which has as it centre-piece the engine control platform of a destroyer. Insulation is the keynote of the Ministry of Fuel and Power's contribution, and their stand shows how efficient insulation will result not only in improved space heating, but also in a material reduction in the fuel consumption.

The most important of the four Departments' exhibits from the point of view of the gas engineer is that of the Department of Scientific and Industrial Research. In particular, the Fuel Research Station's section showed the furnace front of a forced-draught Scotch marine boiler and also of a natural-draught Lancashire boiler, illustrating the application of smoke eliminators developed at the Station and successfully used during the war to reduce smoke emission from the funnels of Allied coal-burning ships. The measurement of smoke, sulphur dioxide and lack of sunlight was demonstrated, as well as an interesting illustration of the work carried out to eliminate the formation of deposits on the external side of the heating surfaces of large water-tube boilers burning coal.

Trade Exhibits

Of the 450 firms exhibiting it is possible to single out only a few, and although these have been chosen as being of particular interest to the Gas Industry, it will be appreciated that shortage of space has necessitated many omissions.

A wide range of electric arc welding plant, accessories, and electrodes grace the stand of **Murex Welding Processes, Ltd.** A novel note is struck by the neat 300 amp. motor generator set, complete on a trolley, and fitted with the Murex remote control regulator, which provides an automatic means of adjusting the welding current of motor generator sets without requiring the operator to leave his work. Also shown is a 400 amp. Diesel engine driven set for use in oilfields, electrodes for welding mild steel, high tensile steels and heat resisting steels, non-ferrous metals, cast iron, &c., and an ingenious new dual purpose screen and helmet.

G. A. Harvey & Co. (London), Ltd., are showing a large selection of perforated metals, ornamental grilles, ventilating panels and all meshes and gauges of woven wire gauze. The "Harpo Tapergil" gilled tube is displayed in varied diameters and pitch of gills; this is claimed to be greatly superior to the ordinary gill wound on the tube cold, for it has no crimp, is twice as thick at the bottom than at the outside edge, the cross section being tapered.

Crucibles, basins and similar products for the foundry are the speciality of the **Morgan Crucible Co., Ltd.** Some idea of the great variety of size and type of their products can be gained by examining

their attractive stand. A new type of crucible furnace for the melting of swarg and metal powders has its body and special bottle-shaped crucible in continuous rotation whilst melting. Many types of gas fired furnaces are shown, together with a wide range of refractories.

Examples of Lockheed hydraulic equipment for the Gas Industry are displayed by **Automotive Products Co., Ltd.**, and provide many sources of interest. In particular, mention should be made of a compact hydraulic power unit for driving the rotary grates of producer gas plants. The manufacturers are evolving a simplified automatic sequence controller with a wide speed range on batteries of retorts. Also shown are examples of Borg & Beck industrial clutches, Lockheed Avery flexible hoses and self-sealing couplings, and Purolator metal element filters for all common fluids.

In addition to the usual wide range of standard Saunders diaphragm valves, the **Saunders Valve Co., Ltd.**, are displaying two new developments now in production, an air-motor operated valve and a self-closing valve. The former has a "mushroom" head built into the bonnet through which the power medium is admitted to close the valve. Spring and pipe-line pressure combine to open it, but there is provision for "floating" the diaphragm in any pre-determined mid-position. The self-closing valve operates when the compressed air supply controlled by it falls in pressure below a pre-determined value, and does not open of iteself when working pressure is restored. The Saunders glandless diaphragm plug cock is another comparative newcomer. Six models from the range of "Safran" pumps are also shown.

A stand of great interest is that of **Vickers-Armstrongs, Ltd.**, which displays a selection of industrial machinery. A heavy three-roll ink grinding mill is designed for the fine grinding of stiff lithographic and offset inks, while a toilet soap plodder receives milled soap ribbons and extrudes them in the form of a solid, highly compressed soap bar, imparting a high polish. A hardness testing machine gives results in Vicker Pyramid numerals, and a boxmaking machine and stitching machines are also noteworthy. Examples of "VSG" hydraulic speed gears and pumps are also shown.

Uses of Graphite

A panorama of the manifold applications of colloidal graphite and semi-colloidal graphite is exhibited by **Acheson Colloids, Ltd.**, displaying examples from light and heavy engineering, metal working, electrical trades and various specialized branches. As "dag" dispersions are now available in mineral oil, water, acetone, white spirit, alcohol, and other carriers, the method of forming dry films and coatings is graphically illustrated and the research and practical properties of these coatings explained.

The ingenious stand of **Evershed & Vignoles, Ltd.**, is constructed to give a practical demonstration of the firm's latest designs of position controllers and Servo mechanisms. A new arrival is the Evershed electronic repeater which is an instrument for distant indication. A range of transmitters is on show, some containing measuring instruments while others are for direct coupling to the mechanism whose positions are to be repeated. The repeater is used for remote indication of such quantities as water level, water, gas, and steam pressure and flow, electrical quantities, &c. Many other types of recorders and controllers are on view, together with testing sets, salinometers, tachometers, and a rudder indicator.

Interesting examples of heavy plant are well displaying on the stand of **Peter Brotherhood, Ltd.** A vertical two-crank, two-stage forced lubricated double acting air compressor has a capacity of 65,000 cu.ft. of free air per hour to 135 lb. per sq. in. gauge when operating at 365 r.p.m. The mechanical portion of a 200 kW. geared driven alternator is also shown, together with a 22 in. mean diameter forced lubricated impulse steam turbine of the overhung type, developing 100 B.h.p. at 4,000 r.p.m. when supplied with saturated steam at 110 lb. per sq. in. gauge and exhausting to atmosphere or against back pressure of 3 lb. per sq. in. An ammonia refrigerating compressor, a metering and proportioning pump, Diesel engine parts, and a scale model cooling tower are also exhibited.

Phosphorus

A display of phosphorus, phosphoric acid, phosphates, and other chemicals is to be seen on the stand of **Albright & Wilson, Ltd.** Phosphorus is, of course, used for making phosphor alloys, while pickling of iron and steel plates in phosphoric acid produces a protective coating on the metal, which is an ideal base for painting. A recent development is electrolytic polishing where phosphoric acid is an important component of the electrolyte. Sodium phosphates and sodium metaphosphate are used to prevent scale formation and corrosion in the treatment of boiler feed and cooling water. Trisodium phosphate and carbon tetrachloride are well known as degreasing agents.

A fine array of drills, grinders, rammers, and chipping and scaling hammers grace the **Armstrong Whitworth & Co. (Pneumatic Tools), Ltd.**, stand, where are also shown stationary and portable air and gas compressors made by their associates, **Air Pumps, Ltd.** Other associated companies are represented and the display will appeal to engineers in very varying industries.

Models of pulverized fuel-fired head high boilers, Babcock-Detroit stoker-fired boilers, intergral furnace boilers, and marine boilers are a feature of the **Babcock & Wilcox, Ltd.**, stand. There are working exhibits of electric and hydraulic automatically controlled soot-blowers and typical examples of oil burners. In short, most necessities for the stokehold are in evidence.

Demonstrations of welding and cutting are proving a popular sight at the entertaining stand of **British Industrial Gases, Ltd.** On view are precision regulators for reducing and controlling oxygen, dissolved acetylene and other gases at varying inlet and outlet pressures between 2,000 lb. per sq. in. and down to 1 lb. per sq. in., and a wide variety of equipment and accessories for the welding and cutting of metals, including wires, rods, fluxes, hose, goggles, cylinder trucks, &c.

The British Vacuum Cleaner & Engineering Co., Ltd., have upon their attractive stand a large range of cleaning apparatus. Ranging from ½ h.p. to 8 h.p., the B.V.C. portable industrial cleaners are both handsome and neat, designed as they are to operate in limited floor space. A B.V.C. central installation was typified by a compact motor-driven exhauster and a dust filter with detachable dust container which can be installed in a convenient position in or outside the building Also shown is a flue dust removal plant for the rapid and efficient removal of the solid products of combustion whereby steam boilers can be kept free of accumulations of flue dust.

Chief among the exhibits on the stand of **Cochran & Company, Annan, Ltd.**, is a composite exhaust-gas and oil-fired boiler, suitable for operating a 3,000 h.p. Doxford opposed-piston engine, and with a Wallsend Low air pressure oil-firing gear. Evaporations are at 120 lb. pressure from feed at 60° F.; from exhaust gases, 2,100 lb. per hour; from oil-firing 3,200 lb. per hour.

Dewrance & Co., Ltd., are showing an impressive six-cylinder, two-cycle, direct reversing, cold starting Widdop Diesel engine, with a speed of 400 r.p.m. Manoeuvring and speed control in both directions is from a single lever. Typical of the Company's mechanical reverse gear models is a 42 h.p. two-cylinder motor, running at 500 r.p.m., while a ship's auxiliary compressor set fitted with a 5 h.p. four-cycle engine completes the main exhibit.

An interesting display of industrial rubber goods is to be seen on the **Dunlop Rubber Co.**'s stand, including examples of belting, hose, rubber lined bearing, gloves, gasket, washers, &c.

Easiwork, Ltd., exhibit their usual range of cooking apparatus. The Easiwork health cooker, which cooks complete meal for five or eight persons in 20-30 minutes and can be used on gas, electricity or oil is shown, together with a pressure cooker and waffle cooker.

Measuring Instruments

A complete range of temperature measuring instruments for industrial and laboratory use makes the stand of the **Foster Instrument Co., Ltd.**, one of exceptional interest. Among the instruments shown are thermo-coupee, optical, radiation, and potentiometric pyrometers, photo-electric indicating, recording, and control equipment, and a range of intrascopes for inspecting internal surfaces to a depth of over 30 ft.

Transformers and switchboards for marine use and general industrial purpose equipment are attractively displayed by **Foster Transformers & Switchgear, Ltd.**, including typical examples of all sizes.

A comprehensive display of modern tube bending machinery will be found on the stand of **Hilmor, Ltd.**, including portable and bench fixture benders for the plumber, electrician, and gasfitter, as well as power-operated universal and mandrel benders for heavier purposes.

A good selection of the many alloys produced by the **Metals Division of Imperial Chemical Industries, Ltd.**, are exhibited on their stand. These include condenser tubes and ferrules, in cupro-nickel, "Alumbro," and similar alloys. Plate, sheet, rod, tube extrusions, and wire in brass, copper, &c., and aluminium alloy products for engineering purposes are also shown.

Fine examples of overhead chain conveying systems are exhibited by **Geo. W. King, Ltd.** These feature the "Power-Pulled" and "Dual-Duty" conveyors. Also shown is an electric chain pulley block, typical of a series of three models ranging in capacity from 5 cwt. to 10 ton. Various types of track electrification and ancillary equipment for material handling are also exhibited.

The products of the **Rawlplug Co., Ltd.**, should be too well known to need description and it is necessary only to mention that a very full selection of their many fixing materials may be found on their attractive stand.

Compressors and Exhausters

Among the air compressors and exhausters for land and marine use exhibited by **Reavell & Co., Ltd.**, are a four-stage compressor for 200 atmospheres and upwards, a small three-stage compressor for 4,500 lb., one of a new range for 150 lb., and various types of rotary compressors and a small turbo compressor. Also shown is the "Reavell-Askania" regulator.

The usual large range of steel tubes for all purposes, including tubes for the conveyance of steam, gas, water, oil, and sewage, is exhibited by **Stewarts & Lloyds, Ltd.**, although there is a strong element of marine equipment as well.

Thomas & Bishop, Ltd., show a variety of products: Flexo belt treatment is a method of keeping belts in good condition, enabling

slack running without risk of slipping; Permac makes permanent leakproof joints for steam, gas, water, petrol, &c., standing up to all temperatures and pressures; Flexo tinning compound cleans and tins all dirty metals; and Tebcon roofing compound provides complete water resistance.

The main feature of the **Turbine Furnace Co., Ltd.,** stand is a full-size boiler frontplate, the left hand flue fitted with Turbine patent furnaces, arranged for firing by mechanical stokers of the shovel or sprinkler type, and complete with extension grate, which facilitate cleaning. The right hand flue is fitted with a Turbine furnace arranged for hand firing, and the Turbulence bridge bar.

Pride of place on the stand of the **Turnbridge Mfg. & Supply Co., Ltd.,** is Stixeat fireproof aluminium paint, which resists red heat without discoloration or destruction, is quick drying, reflects light, reduces radiation of heat and is grease and waterproof; its approximate coverage is 800 sq. ft. per gall. Several other enamels are shown.

A large selection of welding sets, electrodes, and equipment for electric arc welding are displayed by the **Quasi-Arc Co., Ltd.** The sets include alternating and direct current types, and engine-driven sets. An interesting item is the new regulator for A.C. supply for remote control of welding current; another newcomer is an arc welding time recorder.

LIVERPOOL TRAINING SCHEME

The question of training is one which has taken much of the post-war limelight, embracing as it does the rehabilitation of ex-servicemen. We have in the past published several descriptions of these special training courses, and to these can be added the scheme devised by the Liverpool Gas Company.

During the war, instruction was given to the Services and to personnel employed on special production work by means of a technique known as "Training Within Industry." The same procedure was adopted by the Liverpool Gas Company in the planning of their Training Centre. Careful selection was made of six members of the technical staff, three of whom had already had considerable teaching experience, and they received an extensive training course for instructors from the Gas Light and Coke Company. Meanwhile the Board of Directors approved a scheme of training prepared by Mr. J. G. O. Drake, Sales Manager of the Company, and appointed Mr. H. P. Lupton as Vocational Training Officer to conduct the development of the scheme.

The work of the Training Centre falls into four sections : (*i*) A gas fitter's apprenticeship scheme; (*ii*) a salesman training scheme; (*iii*) a series of refresher courses; (*iv*) an information bureau for personnel who wish for guidance on education matters. The Centre is in close touch with the Physical Testing Laboratory of the Company and is co-operating with the laboratory staff in the preparation of a "data" book which will give details of all appliances approved by the Company.

In 1946 an improved course of instruction for apprentices was arranged. Founded on experience gained by the Gas Light and Coke Company and the Brighton, Hove and Worthing Gas Company, the first year is spent in the Training Centre doing the usual practical work, including practice in the use of calipers in marking off blue prints and also elementary carpentry; throughout the year lectures are given in the Centre and apprentices take part-time classes at the Oulton Extension Technical School. The second year takes them, by rota, through the mechanic's shop, brass shop, tinsmith's shop, meter repair shop, meter testing department, cooker shop, and joiner shop with further theoretical instruction. The next three years are spent with fitters and take the various City and Guilds grades.

The needs of the sales staff are met by a 15-week course, divided into three sections: (*i*) technical (9 weeks) including practical fitting, theoretical principles, estimating, shops and works practice; (*ii*) clerical (2 weeks), including administration, organization and system, ordering materials, &c., (*iii*) salesmanship. The first part includes visits to works of appliance manufacturers and the salesmanship course is held at Radiant House and includes an elocution teacher.

At present the Centre is responsible for the training of over 300 of the Company's employees and mentioning these training methods, Mr. H. S. Magnay, M.A., Director of Education to the City of Liverpool, writes in a foreword to a booklet describing their inception and growth. "This not only provides a means of discovering hidden talent amongst the employees but it enables the young people themselves to make contact with those who are responsible for the different branches of the Gas Industry's activities at an early stage in their career."

B.G.C. "INFRA-RED" EXHIBITION

The British Gas Council's "Infra-Red Heating by Gas" Exhibition which closed on Aug. 29 after a run of 10 weeks at Gas Industry House has proved an outstanding success. It was seen by more than 800 people, most of whom had some specialized interest in the various applications of the process. Large attendances were recorded at the Press previews on June 18 and the official opening on the following day. A report of the opening was given in the "JOURNAL" of June 25.

The record of visitors to Gas Industry House gives some indication of the widespread interest aroused by the display. Representatives of many of the largest industrial organizations came from all parts of Britain, and overseas callers were welcomed from Australia, Belgium, Canada, France, Egypt, Holland, Hungary, India, and South Africa. Other visitors were: Government Departments—Ministries of Fuel and Power, Supply, Works, Education, the Admiralty, War Office, Air Ministry, National Coal Board, and Patents Office. Educational bodies—London University, Manchester University, Croydon Polytechnic, Battersea Secondary School, and College of Fuel Technology.

In Britain a large number of the national Provincial newspapers published brief editorials, while world coverage resulted through such mediums as the Central Office of Information, international syndication by news and features agencies and the B.B.C. Naturally, however, chief interest was, and is still being shown by the trade and technical journals, where the results have been quite exceptional.

The British Gas Council's Press Office has already scheduled articles in more than 100 publications of this type and their records are still far from complete. The following selected list shows the wide range of coverage and will provide a brief reference for members of the Gas Industry interested in any particular application of infra-red gas heating: *Aeroplane, Air Treatment Engineer, Architects Journal, British Bulletin of Commerce, British Plastics, British Trade Journal, British Packer, Builder, Building, Cabinet Maker, Chamber of Commerce Journal, Chemical Age, Chemist and Druggist, Commercial Motor, Decorator, Engineer, Engineering, Foundry Trades Journal, Garage and Motor Agent, Hardware Trade Journal, Illustrated Carpenter and Builder, Industrial Chemist, Industrial Heating Engineer, Iron and Coal Trades Review, Ironmongers' Weekly, Ironmonger, Journal of Aircraft Manufacturing Industry, Machinist, Metallurgia, Mining World, Motor Commerce, Motor Cycle, Motor Transport, Overseas Engineer, Paint, Paint Technology, Personnel Management, Pharmaceutical Journal, Plumber, Stationery Trades Review, Sheet Metal Industries, Tin-Printer and Box Maker.*

INDUSTRIAL WALES

The Industrial Wales Exhibition at Olympia was opened by The Rt. Hon. Viscount Portal. The main purpose of this Welsh Exhibition is to demonstrate the successful progress of the lesser industries of Wales that have been developed during the last 10 years. The wide variety of goods now manufactured includes nearly everything required for personal and household use, from fashion goods to domestic appliances. The great Welsh basic industries of coal, steel, and tinplate are illustrated at this Exhibition, and the considerable shipping facilities now active in the transport of Welsh products to overseas markets. In addition, different aspects of Welsh culture and the Welsh way of life are shown.

The National Coal Board stages the most complete demonstration yet seen of the various aspects of coal-mining. Commanding the entrance to the Exhibition is a 9 ft. plaster statue of a miner; behind this are three metal pit-road arches leading to the main stand of the Exhibition. The stand's seven panels illustrate the dependence of all phases of industrial and domestic life upon coal.

On the Coal Board's second stand is a working model of a colliery pithead gear and surface layout. Miniature coal tubs laden with coal run on electric rails to the shaft bottom, and are wound up the shaft in a cage to the top of the pithead, where they are unloaded on to a model conveyor. The coal then goes through all the screening and sorting processes it would do in reality, and is finally loaded mechanically on movable conveyors into waiting model N.C.B. trucks.

This stand also contains samples of the various types of Welsh coal that are marketed, and a series of illuminated panels illustrating the history of the Welsh coalfields. At the rear of the stand is a set of murals contrasting the old conditions with those of modern mechanized mining.

On the British Gas Council's stand there is a display showing photographs of industrial gas appliances in operation, with sample products of the goods they helped to make. Among these are a gas-operated battery melting furnace, used in making rainwater guttering and pipes, a pressure die-casting machine for toys and household fittings, a walking-beam furnace for miniature tank plates, a gas-fired oven for vacuum flasks, a heat metal spray gun for aluminium rods sprayed with various metals, a convection oven for paint drying of window frames, a galvanizing bath for buckets, a gas-fired bar heating furnace for rivets, a vertical furnace for heat treatment of metal tubing, a gas-fired infra-red tunnel for a variety of products, and models of tubular furniture, and a gas-fired steam boiler for tobacco drying and maturing, used in the making of cigars and cigarettes. A demonstration of home welfare as applicable to the installation of gas appliances in houses on industrial development estates includes such appliances as a Main cooker, Dean and Radiation gas boilers, an Electrolux built-in gas-operated refrigerator, and Ascot, Ewart, and New World water-heaters.

There is also an exhibition stand of Welsh social services, and here a panel illustrating many of the activities of the Women's Gas Council are prominently displayed.

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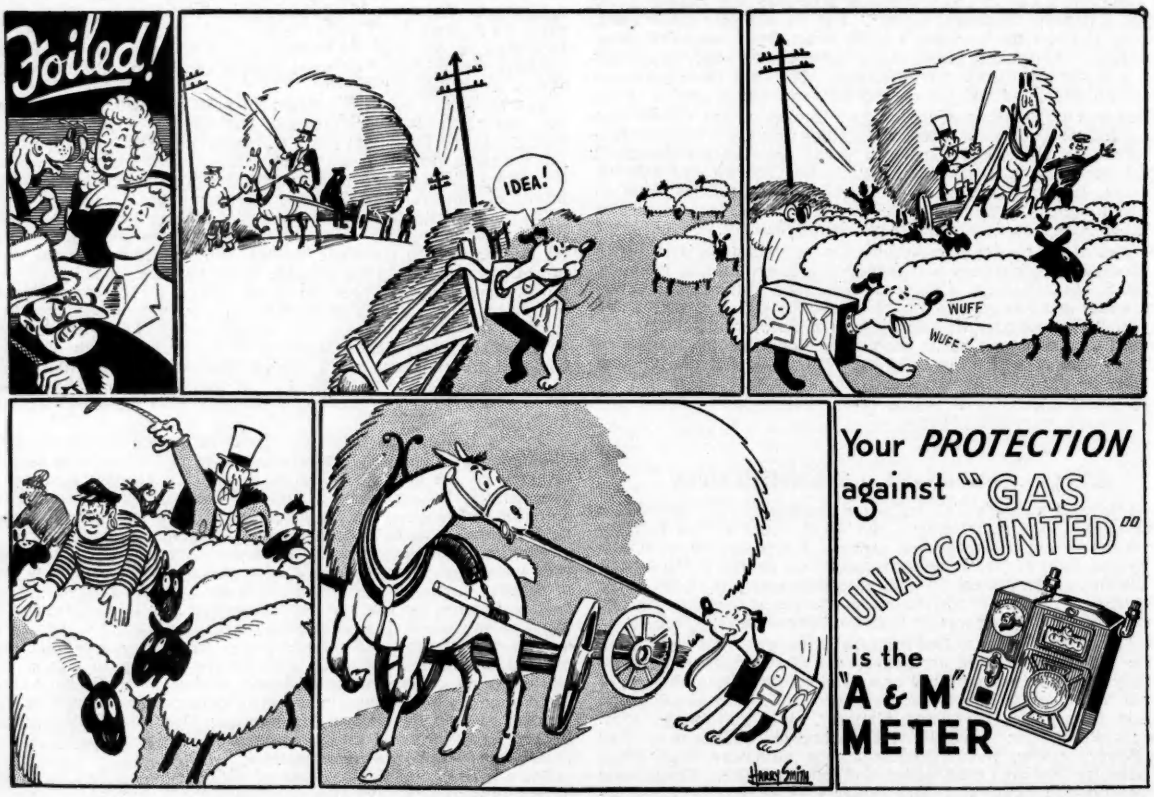

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GAS CONSOLIDATION, LTD.

THE thirteenth annual general meeting of Gas Consolidation, Ltd. was held recently in London. Sir LESLIE BOYCE, K.B.E., the Chairman, who presided, said:

The Directors' report and statement of accounts for the financial year to May last have been in your hands for some days and, with your permission, I shall take them as read.

At our last annual meeting I informed you of the serious illness of Major Julian Day who had been Chairman of this Company since 1934. It is now my grievous duty to report his death in June of this year. His passing has been a great loss to this Company and its close associate, the Severn Valley Gas Corporation, Ltd. Their formation was the outcome of Major Day's initiative and far-seeing judgment and, as Chairman of the two Companies until his death, he was largely responsible for the very satisfactory development of the gas undertakings grouped under their control. He was held in high esteem throughout the Gas Industry and those of us who were privileged to be his colleagues miss his wise counsel no less than his many personal qualities which we so much admired.

At their meeting in July last the Board appointed me Chairman of Directors and I would like to take this opportunity to assure you that I fully appreciate the importance of the office and that I shall endeavour to discharge my duties and responsibilities to the best of my ability.

In the balance sheet which is before you there appears to be only one item calling for comment—namely, the increase in investments. During the year it was deemed advisable to alter the structure and broaden the activities of a subsidiary company, the Palatine Gas Corporation, Ltd.—now known as the Palatine Development Company, Ltd. That Company has sold to Gas Consolidation, Ltd., its holding in the Ashton Gas Company and, at the same time, acquired from the former, and from the Severn Valley Gas Corporation, Ltd., certain extraneous investments. The issued share capital of the Palatine Company is now held in equal proportions by Gas Consolidation, Ltd., and Severn Valley Gas Corporation, Ltd.

Turning to the revenue and appropriation accounts, it will be noted that they contain nothing to suggest anything but steady progress and that they disclose a very satisfactory and stable position. The total income received was within a few hundred pounds of that earned in 1945-46 and the net figure carried to the appropriation account was £22,406, compared with £22,237 for the previous year.

Dividends on the two classes of Preference stock have been paid and the Directors now recommend final dividends of 2½% and 3%, less tax, on the "A" and "B" Ordinary stock, making with the interim dividends already paid, dividends of 5%, less tax, for the year. These rates are the same as have been paid since 1940. After providing for these dividends there will remain a surplus of £2,603 on the year's working to be added to the carry-forward which will then stand at £24,952.

These results will no doubt commend themselves to the stockholders and, in view of the exceptional difficulties with which the Company has had to contend during the greater part of its comparatively brief existence, the figures now before you give ample proof of the inherent strength and soundness of such an enterprise as that represented by Gas Consolidation, Ltd.

From 1934 to the outbreak of war, the Directors pursued their primary aim of building up geographical blocks of gas undertakings with the object of closing down the smaller and uneconomic units of production and of providing ample quantities of cheap gas throughout the area by means of regional grids. This policy entailed the concentration of gas production at the works of the larger and more efficient companies and the taking of gas from neighbouring coke ovens, wherever it was available and was to the companies' advantage to do so.

Unfortunately, the war intervened when 18 gas undertakings had been acquired. Three of these have been absorbed by other undertakings in the group and their works closed down; three other companies receive the whole, or part, of their requirements from their larger neighbours and much benefit has been derived by the full use of coke oven gas.

We planned to increase still further the number of undertakings under our control and to pursue progressively our policy of extension and improvement. This was, to some extent, stultified by the restrictions imposed by the war and its aftermath, during which years we were called upon to meet a greatly increased demand for gas. There is no doubt that, but for the degree of integration of our works, utilization of coke oven gas and co-operation of our personnel, our success in meeting such a demand would not have been possible.

The total quantity of gas sold by group companies during the year under review shows an increase of 66% over that sold by the same undertakings at the time of their acquisition. During the war years the demand for gas rose very rapidly and was increased still further during the past exceptionally rigorous winter.

The acute shortage of labour and materials which has existed for the past seven years has made it virtually impossible to maintain the works and distribution systems at that standard of efficiency which is the constant aim of the Directors and management. It therefore reflects the greatest credit on our central organization and on the Managers and personnel at the individual works that such a large measure of success has been achieved in meeting this exceptional increase in gas demand.

We fully expect that the demands for gas which will be made upon our undertakings during the coming winter will tax the ingenuity and resourcefulness of this organization to the full. We shall certainly do our utmost to meet all requirements. Our task would be lessened to a considerable degree if there were some improvement in the quantity and quality of coal supplied to our works.

Our undertakings are severely handicapped by the inferior quality of some of the coals they are compelled to use and by the fact that we are no longer free agents in respect of coal purchases. There is an increasing tendency on the part of coal suppliers to allocate supplies of their own choice to the various works. In many cases we would not entertain the use of such coals because of their low thermal yield and high ash content, if we were not obliged to do so.

We hope that, as a result of the formation of a Coal Consumers Council under the auspices of the National Coal Board, the day is not far distant when we shall again be able to purchase those coals which we consider to be the most suitable for our purposes and which would give the highest efficiency.

The cost of a ton of coal to undertakings in this group over the past year worked out at 120.4% above the price paid by the same undertakings at the time of their acquisition. As coal is the basic raw material of the Gas Industry, it naturally constitutes the largest item of expenditure in a gas company's accounts; the next most important items are labour and other materials, the costs of which have also risen very steeply. Nevertheless, in the Gas Consolidation group, the average price received per therm of gas sold has increased by no more than 17.3% over the same period. This remarkable result is conclusive proof of the over-all efficiency of the group.

The team spirit, which is common throughout the group and is largely responsible for these results as a whole, might well disappear if our organization were absorbed by an impersonal national body. We are convinced that State ownership of the Gas Industry would inevitably be to the disadvantage of consumer, employee and stockholder alike.

Colonel R. H. Studholme, who is already a Director of Severn Valley Gas Corporation, Ltd., and of many gas undertakings controlled by both the Severn Valley and Gas Consolidation groups, has been appointed a Director of this Company to fill the vacancy created by Major Day's death. Colonel Studholme's exceptional capabilities and sound judgment have been appreciated by the Board for many years and we extend to him a warm welcome in his new appointment.

Finally, I should like once again to acknowledge our great indebtedness to the General Manager, Mr. R. S. Snelling, and to all officials, staff and other employees of our central organization and of our subsidiary Companies for their loyal and energetic co-operation which has enabled these satisfactory results to be placed before you.

The report and accounts were unanimously adopted.

STRIKE REDUCES GAS SUPPLY

The dispute of the South Yorkshire miners has now extended over four weeks, and has resulted in an estimated loss of 385,000 tons of coal. It is thought that holidays at a dozen pits in the Doncaster area this week may add another 150,000 tons to the total.

Meantime the Coal Board has issued instructions to West Riding Group of gas companies to reduce coal consumption at four carbonization plants by 45%. This decision will affect 3,000 industrial and more than 100,000 domestic gas consumers and it is feared will lead to short-time working in the steel, woollen, brick, and other industries over a wide area. Reduced supplies of bread are also threatened because a number of bakers' ovens are gas-heated. Two glass bottle manufacturers at Knottingley, employing nearly 500 workers, have closed down indefinitely, and another glass firm has given notice that they will close in two or three days' time. A West Riding baker, typical of many others affected, has cut bread production by one-third of the normal output. A director of British Jeffrey Diamond, Ltd., Wakefield, who produce coalmining machinery, said the firm's output would be seriously affected. Other works affected are the Yorkshire Copper Works, at Stourton, near Leeds, and Tarran Industries, at Sherburn, where prefabricated houses are being manufactured.

The authorities hope to supply full pressure daily from 7 a.m. to 8.30 a.m., 11.30 a.m. to 1.30 p.m., 4.30 p.m. to 6.30 p.m., and 9 p.m. to 10.30 p.m. For technical reasons, although the cut in coal is 45%, the actual production of gas will be cut to 30% of normal. The lighting of railway stations and goods yards in the area as well as street lighting is affected. Consumers generally in the West Riding are advised to see that gas by-pass taps are turned off, especially those for pilot lights.